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IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Applicant: Geoffrey Donald Tremain
App. Serial No.: 09/898,286
Group Art Unit: 2136
Filed: July 3, 2001
Examiner: Shiferaw, Eleni A.
For: Method and Apparatus for Providing Computer Services

AFFIDAVIT OF GEOFFREY DONALD TREMAIN

Atty. Dkt. No.: 1821-01100

Date: January 19, 2006

Commissioner for Patents
P. O. Box 1450
Alexandria, VA 22313-1450
Sir:

PURPOSE OF DECLARATION

This declaration is made in support of the *Response to Final Office Action Dated July 22, 2005*, which is filed concurrently herewith.

STATEMENT OF FACTS

1. I, Geoffrey Donald Tremain, state as follows:
2. I am over 18 years of age and competent to make this Affidavit;
3. I am employed by Ernst & Young Services Limited, a wholly owned subsidiary company of Ernst & Young LLP, the assignee of the above-identified pending patent application, and have been employed by them since November 1996 as an information systems and security consultant, with the current grade of Senior Manager;
4. I obtained a Bachelor of Science degree with honours in Physics from the University of Bristol, UK in 1986.
5. I am the sole named inventor in the above-identified pending patent application;

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6. In brief, the principal problem which is addressed by my invention as defined by the independent claims of the present application is how to host or provide computer services (such as applications hosting services, web hosting services, etc., as detailed in the present application) for plural customers in a secure way whilst minimizing the real physical resources which are required. This is a significant and very real and current technical problem.

7. At present, those who are providing such hosting services for third parties typically have very many real computers, with a respective real computer being dedicated to each customer. Before my invention, this was the accepted way of providing such services, being the most straightforward and obvious way to provide such services. This has significant cost and maintenance implications for the provider, which inevitably results in relatively high costs being passed onto the customers. Moreover, if customers run applications on a shared computer with a common operating environment, data and applications will be far less isolated from each other, raising security, functionality and performance difficulties.

8. The present invention solves this technical problem with a technical solution, namely the creation and use of plural virtual machines for the respective customers. The present invention delivers significant commercial advantages which include but are not limited to: lower costs of provisioning of service for the supplier, allowing higher profit margins as well as more competitive pricing to customers, and the ability to create, modify and terminate instantly and flexibly customer-specified and configured computing infrastructure on demand, in a way that provides strong isolation between different customers' systems, as well as strong isolation between systems of a single customer, for example when security isolation is desired between different parts of a system. In summary, the present invention gives customers the benefits of dedicated computer systems for the costs of shared ones, as well as giving them great flexibility in the speed with which they can procure, specify and configure their systems. Similarly, for the service provider, this provides a very competitive way of providing computer services to customers offering a mix of price, security isolation and flexibility benefits which cannot be achieved with conventional approaches.

9. At the date of filing of the present patent application, *and indeed generally today*, state-of-the-art approaches to provision of computer infrastructure by service providers to customers simply

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did not and could not deliver these benefits, nor did they employ the present invention. Instead, as mentioned in paragraph 7 above, the state-of-the-art approaches either involved procurement, installation and configuration of dedicated infrastructure with resulting costs and considerable elapsed time, even though the customer's applications would not necessarily consume all available system capacity, or they involved use of shared systems which did not deliver the necessary degree of security isolation needed for the majority of business applications. Because of these limitations, most users of large-scale computer systems still choose to operate dedicated systems themselves, and are burdened with the necessary procurement, build and operating costs and elapsed time involved. Those skilled in the art of information systems infrastructure provision will recognize the potential of my invention to transform fundamentally the current global market in information technology infrastructure provision;

10. I have reviewed U.S. Patent No. 6,075,938 to Bugnion et al (hereinafter "Bugnion"), U.S. Patent No. 6,810,033 to Derks (hereinafter "Derks"), U.S. Patent No. 6,397,242 to Devine et al (hereinafter "Devine"), and U.S. Patent No. 6,697,824 to Bowman-Amuah (hereinafter "Bowman-Amuah"), which are cited against the present application;

11. The examiner asserts (section 8 of the OA) that the subject matter of independent claims 1, 20 and 54 is obvious in view of Bugnion and Derks;

12. In respect of claims 1 and 20, the examiner asserts (pages 12 and 13 of the OA) that Bugnion discloses "apparatus or a method providing one or more computer services for a plurality of customers, the apparatus comprising a real computer on which is set up of [sic] each of said customers at least one virtual machine for each of said customers, said at least one virtual machine for each of said customers having a specification specified by and configurable by the respective customer and having an operating system running thereon." [emphasis added]. However, based on my review of Bugnion, I can state that Bugnion does not make any reference to customers at all, and does not disclose providing one or more computer services for a plurality of customers, nor setting up a virtual machine for each of a plurality of customers, nor a virtual machine that has a specification that is specified by and configurable by a customer, nor the benefits of the application of such technology as described in paragraph 8 above;

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13. The examiner further asserts (page 13 of the OA) that Bugnion does not explicitly teach "set up request of each of said customers [sic]". I can state that this is true, because Bugnion does not refer to customers at all, as stated above;

14. The examiner further asserts (page 13 of the OA) that Derks discloses "set up request of each of said customers to set up virtual connections". As I will explain further below, Derks does not disclose virtual machines at all, but instead relates (only) to private virtual networking of voice telephony, rather than computer service provision;

15. In respect of claim 54, the examiner asserts (pages 13 and 14 of the OA) that Bugnion discloses "a method of providing for a plurality of customers one or more computer services selected from: file, data and archiving services; applications hosting services; database hosting services; data warehouse services; knowledge management hosting services; digital media production services; "intellectual property" and streaming media services; simple web hosting services; complex e-commerce web hosting services; high performance computation services; electronic messaging and conferencing services; and, learning neuro-computer services; the method comprising the steps of: setting up on a real computer of [sic] each of said customers at least one virtual machine for each of said customers, said at least one virtual machine for each of said customers having a specification determined in accordance with the computer service, and being configurable by said consumer [sic], said at least one virtual machine having an operating system running thereon." [emphasis added]. However, as stated above, Bugnion does not disclose customers at all, and does not disclose providing one or more computer services for a plurality of customers, nor setting up a virtual machine for each of a plurality of customers, nor a virtual machine that has a specification that is specified by and configurable by a customer;

16. Bugnion discloses what is known as a "virtual machine monitor", i.e. a piece of software that is used to create and monitor virtual machines on a real computer. I am familiar with virtual machines and virtual machine monitors, including the actual product that is the subject of Bugnion. Virtual machines as such are old and well known. As mentioned on for example page 17 of the present application and at column 2, lines 36 onwards of Bugnion, IBM developed virtual machine technology in the late 1960s and early 1970s and therefore this technology as such has been in existence for a very long time. A simple definition of a virtual machine is "a self-contained operating environment that behaves as if it is a separate computer". A virtual machine is created

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using software, such as a virtual machine monitor as disclosed by Bugnion, and in essence only exists temporarily in the memory of a real computer. In the sense used in the present application, a virtual machine is a practically self-contained operating environment that behaves as if it is a separate computer, separately of the real or physical computer on which the software that generates the virtual machine is run;

17. Virtual machines were created historically to allow computer scientists and the like to develop new software applications and operating systems safely. The computer scientists would typically create a virtual machine on a real machine and use the virtual machine to develop and test new software (such as operating systems and software applications). Plural virtual machines might be set up, with each running different versions of the software. The main advantage of using the virtual machine rather than the real computer was that if the software being developed caused problems to the operating system running on the virtual machine or to the virtual machine itself, then only the virtual machine would "crash", and the underlying real computer would not be affected at all. Thus, computer scientists could safely develop new software without concern as to whether the new software might cause problems for the real computer. The inconvenience of a real computer crashing was and is a significant problem, owing to the delay in restarting the computer and the like and because of the possibility of serious and irrecoverable damage being caused to the real computer.

18. Thus, Bugnion is directed to and, in terms of its relevance to my invention, relates only to a virtual machine monitor that can efficiently create plural virtual machines on a real computer. A computer scientist or the like can use the virtual machine monitor of Bugnion (or, for that matter, any other virtual machine monitor) to create plural virtual machines on a real computer. The computer scientist can then for example run the Linux operating system on one of those virtual machines, Windows XP on another of those virtual machines, MS-DOS on another of those virtual machines, etc. The computer scientist can then run different software applications on those virtual machines, or different versions of the operating systems on those virtual machines, and develop and test those software applications or operating systems without any concern that a "crash" on one of those virtual machines might affect that software applications or operating systems running on the other virtual machines. In this respect, Bugnion merely discloses one piece of software which could be used as a tool in forming an actual commercial embodiment of my invention, but does not disclose my invention. To go from the virtual machine monitor for forming virtual machines as

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disclosed by Bugnion to my invention, which makes commercial use of virtual machines that have a specification that is specified and configurable by a customer to provide computer services to the customers with a range of distinct commercial benefits, was not an obvious modification of the prior art;

19. On the other hand, Derks relates to what Derks calls "Private Virtual Networking", which in the Derks patent refers to the ability of a telephone network to switch and route telephone calls in a particular way;

20. As can be seen, therefore, a virtual machine is nothing like a Private Virtual Network and vice versa. The technologies and underlying concepts are entirely different, they are created using entirely different technologies, and they were originally designed and exist for entirely different purposes. Telephony Private Virtual Network technology is not related to the present invention and an understanding of telephony Private Virtual Networks would not bring one skilled in the art of virtual machines any closer to the present invention;

21. For these reasons, my invention as defined in claims 1, 20 and 54 is not obvious in view of Bugnion and Derks. Despite the state of the art with respect to virtual machines, until I conceived of the presently claimed system, in which computer services are provided for plural customers by using a real computer having plural virtual machines for the different customers, each customer specifying and configuring their own virtual machine, no-one had contemplated such a system because no-one had appreciated that virtual machines could be used in this manner;

22. The examiner objects (section 5 of the OA) that the subject matter of independent claim 37 is known from Devine. In particular, the examiner asserts (page 5 of the OA) that Devine teaches "a method of operating a real computer on behalf of a plurality of customers, the method comprising the step of: operating plural virtual machines on the real computer, each of said plural virtual machines having a specification specified by and configurable by a respective one of the customers in accordance with a computer service to be provided by the virtual machine on behalf of that customer, each of said virtual machines having an operating system running thereon." [emphasis added]. However, based on my review of Devine, I can state that Devine does not make any reference to customers at all, and does not disclose operating a real computer on behalf of a

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plurality of customers, nor setting up plural virtual machines having a specification that is specified by and configurable by the customers;

23. I note that, in terms of its relevance to my invention, Devine in essence discloses the same concepts as Bugnion, namely a virtual machine monitor, and therefore my comments above in relation to Bugnion apply equally to Devine. I note that the three named inventors of Devine are the same three named inventors of Bugnion;

24. It may be that the examiner is for some reason equating the term "customer" as used in the present claims with "software application" or similar. However, there is no basis for this comparison and in no sense can a "customer" be equated with or be considered to be analogous to a "software application". Customers are, according to standard usage of the term, people or entities who buy a good or a service. Software applications installed by a computer scientist are not "customers." Furthermore, each of the independent claims of the present application requires that the virtual machine have a specification that is specified and configurable by the customer. To the best of my knowledge the software applications that run on the virtual machines disclosed in Bugnion and Devine do not and cannot specify or configure the specification of the virtual machine;

25. Alternatively or additionally, it may be that the examiner is for some reason equating the term "customer" as used in the present claims with a "computer scientist" or the like, who uses a virtual machine monitor to create virtual machines. However, there is no basis for this comparison and in no sense can "customer" as used in the claims of my patent application be equated with or be considered to be analogous to a "computer scientist" or the like. In Bugnion for example, as conventional with virtual machines, typically one person (a computer scientist) would set up plural virtual machines on a real computer for his own use, for example to run several operating systems, one within each virtual machine. In my invention, a person (such as a service provider) provides apparatus on which is set up plural virtual machines for the customers (i.e. for other people). I refer here to claim 20 of my patent application which specifically refers to a service provider setting up at least one virtual machine for each of said customers. Thus, Bugnion discloses only one person setting up virtual machines for his own use, whereas my invention is concerned with one person (a service provider) setting up virtual machines for other people (the customers);

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26. In addition, each of the independent claims of the present application requires an apparatus or a method that provides computer services (such as applications hosting services, web hosting services, etc., as detailed in the present application and mentioned above) for customers, by using virtual machines. The references do not suggest such a thing. Bugnion for example only discloses using his virtual machine monitor to form plural virtual machines on which several copies of computer operating systems can be run, see for example the Summary of the Invention section at column 4, lines 6 to 50 of Bugnion. Bugnion does not disclose using virtual machines to provide computer services;


27. Further Affiant sayeth not.

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DECLARATION

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

SIGNATURE

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MY COMMISSION EXPIRES AT DEATH

